

**WHAT IS CLAIMED IS:**

1. A rate control method with region of interesting support, which coding macroblocks in a current picture with different priority  $Pri_i$ , the rate control method comprising the steps of:
  - 5 calculating a weighted macroblock activity  $WAct_i$  for each macroblock of the current picture according to the priority  $Pri_i$  and a macroblock activity  $Act_i$ ;
  - calculating a picture activity  $Act_C$  for the current picture according to the weighted macroblock activity  $WAct_i$ ;
  - 10 allocating a bit budget  $BB_i$  for each macroblock according to the priority  $Pri_i$  and a bit budget  $BB_C$  of the current picture;
  - calculating an estimated complexity  $EstCom_C$  for the current picture according to a complexity  $Com_X$  of a previously coded picture, a picture activity  $Act_X$  of the previously coded picture and the picture
  - 15 activity  $Act_C$  of the current picture;
  - calculating an estimated quantizer scale  $EstQ_C$  according to the estimated complexity  $EstCom_C$  and the bit budget  $BB_C$ ;
  - calculating an initial virtual buffer occupancy  $D0$  according to a reaction factor  $R_X$  and the estimated quantizer scale  $EstQ_C$ ;
  - 20 calculating a macroblock quantizer scale  $Q_i$  according to a virtual buffer occupancy  $D_{i-1}$  of a previously coded macroblock, the priority  $Pri_i$  and the reaction factor  $R_X$ ;

encoding each macroblock according to the macroblock quantizer scale  $Q_i$ ;

and

updating a virtual buffer occupancy  $D_i$  of a current coded macroblock

according to a used bit  $UB_i$  of the current coded macroblock, the

5        virtual buffer occupancy  $D_{i-1}$  of the previously coded macroblock and  
      the bit budget  $BB_i$  of the current coded macroblock.

2. The rate control method with region of interesting support of claim 1,  
further comprising the steps of:

updating the complexity  $Com_X$  according to the used bits  $UB_C$  of the

10        coded picture and an average quantizer scale  $Avg_Q$ ; and

assigning the picture activity  $Act_C$  of the current coded picture to the  
picture activity  $Act_X$ .

3. The rate control method with region of interesting support of claim 2,  
wherein the weighted activity  $WAct_i$  is calculated by the equation:

15         $WAct_i = Act_i * Pri_i$ .

4. The rate control method with region of interesting support of claim 3,  
wherein the picture activity  $Act_C$  is the sum of the weighted macroblock  
activity  $WAct_i$  of all macroblocks.

5. The rate control method with region of interesting support of claim 2,  
20        wherein the estimated complexity  $EstCom_C$  is calculated by the equation:

$EstCom_C = Act_C * Com_X / Act_X$ .

6. The rate control method with region of interesting support of claim 5,

wherein the estimated quantizer scale EstQ\_C is calculated by the equation:

$$\text{EstQ\_C} = \text{EstCom\_C} / \text{BB\_C}.$$

7. The rate control method with region of interesting support of claim 6,  
wherein the initial virtual buffer occupancy D0 is calculated by the  
equation:

$$D0 = R\_X / 31 * \text{EstQ\_C}.$$

8. The rate control method with region of interesting support of claim 7,  
wherein the macroblock quantizer scale Q<sub>i</sub> is calculated by the equation:

$$Q_i = D_{i-1} * 31 / R\_X / \text{Pri}_i.$$

9. The rate control method with region of interesting support of claim 8,  
wherein the virtual buffer occupancy D<sub>i</sub> of the current coded macroblock is  
calculated by the equation:

$$D_i = D_{i-1} + \text{UB}_i - \text{BB}_i.$$

10. The rate control method with region of interesting support of claim 9,  
wherein the complexity Com\_X of the coded picture is calculated by the  
equation:

$$\text{Com\_X} = \text{Avg\_Q} * \text{UB\_C}.$$

11. The rate control method with region of interesting support of claim 9,  
wherein the macroblock activity Act<sub>i</sub> of an intra-coded macroblock is the  
sum of the variance of four luminance blocks of the macroblock.

12. The rate control method with region of interesting support of claim 9,  
wherein the macroblock activity Act<sub>i</sub> of an inter-coded is the sum of the

variance of four residual blocks for the macroblock.

13. The rate control method with region of interesting support of claim 1, wherein the macroblocks with larger priority  $Pri_i$  are the region of interesting.